



PhD in Information Technology and Electrical Engineering

Università degli Studi di Napoli Federico II

PhD Student: Rosario Catelli

XXXIII Cycle

Training and Research Activities Report – First Year

Tutor: Prof. Valentina Casola (DIETI)

Co-Tutor: Eng. Concetta Pragliola (Ansaldo STS)

1. Information

I got a master degree in Electronic Engineering on September 2017 at the University of Naples Federico II. My grant is funded by Ansaldo STS with the title “Cybersecurity tools and techniques to protect telecommunication and railway signalling systems” and I joined the CSAC (Cyber Security Assurance & Control) Department and its activities about (1) Policy, Guidelines and Compliance, (2) Standards and Metrics, (3) Security Incident Management, (4) Verification and Validation and (5) Internal Audits.

2. Study and Training Activities

During this first year I followed these courses, external courses and modules:

- *Cloud and Datacenter Networking* (3 CFU) held by the Prof. Roberto Canonico.
- *Quantum Computing and Artificial Intelligence* (6 CFU) held by the Prof. Giovanni Acampora.
- *Cambridge B1 Preliminary* (0 CFU) held by the Prof. Dianna Jean Pickens.
- *Secure System Design* (6 CFU) held by the Prof. Valentina Casola.
- *Network Security* (0 CFU) held by the Prof. Simon Pietro Romano.
- *Elettromagnetismo e relatività* (0 CFU) held by the Prof. Amedeo Capozzoli.
- *IEEEExtreme* (3 CFU) (Organizer Prof. Paolo Maresca).
- *Author Seminar: How to publish a scientific paper* (0.40 CFU) (Organizer Prof. Daniele Riccio).
- *Ciberconflitti sicurezza informatica, difesa, stabilità internazionale e diritto umanitario* (0.80 CFU) (Organizer Prof. Guglielmo Tamburrini).

And these seminars:

- *How does Mathworks accelerate the pace of engineering and science?* (0.2 CFU) held by Ph.D. Francesco Alderisio (Organizer Prof. Mario Di Bernardo).
- *Smart Scaling for High Performance Computing: SuperMUC-NG at the Leibniz Supercomputing Centre (LRZ)* (0.4 CFU) held by Prof. Dieter Kranzmueller (Organizer Prof. Beniamino Di Martino).
- *Interdisciplinary Summer School “Euspace – EU in Space: Law and Technology, Cyber-Security and Space Assets”* (5 CFU) (Organizers Prof. Mario Marchese and Dr. Maria Elena De Maestri).
- *The Napoli Federico II IEEE Student Branch* (0.2 CFU) held by Eng. Stefano Marrone (Organizer Prof. Paolo Maresca).

3. Research activity

I am involved in the cybersecurity related management and operational activities carried out by Ansaldo STS, which are mainly focused on the implementation of an Information Security Management System (ISMS) for corporate systems and tools in compliance with ISO 27001 standard.

The certification process life cycle is currently human assisted and includes supporting the suppliers in verifying their compliance to standard guidelines, supporting auditing activities and enhancing the adopted risk management frameworks.

Open research challenges are:

- ISMSs are currently implemented in compliance with ISO standards but there is no well-defined scheme to follow.
 - The excess of freedom leads to a proliferation of thousands of different ISMSs. There is the need for innovative models to define commonly accepted frameworks or improve the existing ones. (ISO, NIST, ...).

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- Too much human intervention is required in the implementation process (from design to incident management), slowing down the entire management chain.
 - Automated techniques are needed to transform security skills in a security knowledge base and build usable tools.

For these reasons my research activities are split between two planes: the Management Plane and the Operational Plane.

- Support to Security Management Activities:
 - Identify templates for configuring an ISMS according to specific patterns (novel pattern-based ISMSs) and reference standards (ISO, NIST, etc...)
- Support to Security Operational Activities, based on the analysis of the state of the art about:
 - Automated security enforcement tools (MUSA)
 - Reinforcement and monitoring tools and services (ASTS SeSaR, SIEM and SOC)
 - Novel automated incident management techniques (Moving Target Defence and Digital Forensics)

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Cycle XXXIII

	Credits year 1								Credits year 2								Credits year 3								Total	Check
	Estimated	1	2	3	4	5	6	Summary	Estimated	1	2	3	4	5	6	Summary	Estimated	1	2	3	4	5	6	Summary		
Modules	20	0	0	6	3	3	7.2	19.2	11							0								0	19.2	30-70
Seminars	5	0	0	0.6	5.2	0	0	5.8	5							0								0	5.8	10-30
Research	35	10	10	3.4	1.8	7	2.8	35	44							0								0	35	80-140
	60	10	10	10	10	10	10	60	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	180

4. Products

I have produced Ansaldo STS internal report on the analysis and modelling of current certification processes (in order to identify and propose a pattern-based ISMS).

I'm working on a draft paper to submit to the 28th International Conference on Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE) - deadline 20th February.

5. Conferences and seminars

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6. Activities abroad

As reported above I joined the Interdisciplinary Summer School “Euspace – EU in Space: Law and Technology, Cyber-Security and Space Assets” (5 CFU) (Organizers Prof. Mario Marchese and Dr. Maria Elena De Maestri) from 9th to 13th of July in Genova.

7. Tutorship

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